REMARKS

I. Preliminary Matters

Upon entry of the Amendment, which is respectfully requested, claims 1, 3-5 and 7-16 will be pending in the application.

Claim 1 is amended to incorporate the subject matter of claim 6. Accordingly, claim 6 is canceled without prejudice or disclaimer.

Claim 1 is further amended to define separation factor α. Support for the amendments to claim 1 can be found, for example, at paragraphs [0044] and [0062] of the specification, and Fig. 9.

Claim 1 is also amended to correct a minor typographic error, i.e., the gas permeation rate is amended to be 200-7000 $m^3/m^2 \cdot hr \cdot atm$.

No new matter is added, and the amendments to the claims places the application in condition for allowance. Therefore, entry of the Amendment after final is respectfully solicited.

II. Claim Rejections Under 35 U.S.C. § 112

Claims 1 and 3-16 were rejected under 35 U.S.C. § 112, first paragraph for lack of written description in the specification, and claim 3 was further rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

Applicants respectfully submit that the amendment to claim 1 to replace the gas permeation rate of 200-700 $m^3/m^2 \cdot hr \cdot atm$ with 200-7000 $m^3/m^2 \cdot hr \cdot atm$, overcome the § 112 rejections of claims 1 and 3-16.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections.

III. Claim Rejections Under 35 U.S.C. § 103

A. Claims 1, 3-6 and 9-16 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Lai et al. (U.S. Patent No. 5,871,650) and Verduiin et al. (U.S. Patent No. 6,090,289) and Goldsmith et al. (U.S. Patent No. 5,221,484).

B. Claims 7 and 8 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Lai, Verduijn, Goldsmith and Moyer et al. (U.S. Patent No. 5,198,007).

Applicants respectfully submit that claims 1, 3-5 and 7-16 are patentable, at least for the following reasons.

Amended claim 1 recites, in part,

> "wherein thickness of the foundation layer is in the range of 10 - 200 μm,
> wherein a nitrogen gas permeation rate is in the range of 200-7000 $m^3/(m^2 \cdot hr \cdot atm)$,
> wherein a separation factor α of said separation membrane is 1000 or more,
> wherein, in the separation of a first material and a second material, the separation factor α is expressed by the following equation (1),
> $\alpha = (B_1/B_2)/(A_1/A_2)$ ... (1)
> wherein A_1 represents the concentration % by weight of the first material before separation, A_2 represents the concentration % by weight of the second material, B_1 represents the concentration % by weight of the first material in a liquid or gas having permeated through the separation membrane, and B_2 represents the concentration % by weight of the second material."

However, Lai , Verduiin, Goldsmith and Moyer do not teach or suggest a separation factor α and thickness of the foundation layer, as recited in amended claim 1. Moreover, the separation membrane of the amended claim 1 has superior separation performance, as described at paragraph [0062] of specification.

More specifically, at page 4 of the Office Action, the Examiner acknowledges that none of Lai, Verduijn and Goldsmith teaches the claimed nitrogen gas permeation rate. The

Examiner's position is that Lai teaches that the substrate pore size and thickness should be chosen such that the mass transfer resistance does not limit the flux of material permeating through the membrane; Goldsmith teaches the mean pore diameter of the base layer, the mean pore diameter of the foundation layer and the thickness of the foundation layer; and, Verduijn teaches the thickness of the base layer and the foundation layer.

Applicants respectfully disagree with the Examiner's position as follows.

The object of the amended claim 1 is not to choose the substrate pore size and thickness such that the mass transfer resistance does not limit the flux of material permeating through the membrane. The object of the amended claim 1 is to provide a separation membrane which positively improves the permeation performance (permeation rate) so as to ensure an adequate separation capability. See, for example, page 5 paragraph [0012] of the specification. In this respect, Lai teaches away from amended claim 1.

For example, amended claim 1 recites "wherein a nitrogen gas permeation rate is in the range of 200 - 7000 $m^3/m^2 \cdot hr \cdot atm$." With the separation membrane which fulfills the above condition, since the porous substrate shows a nitrogen gas permeation rate of not less than 200 $m^3/m^2 \cdot hr \cdot atm$, it is possible to ensure a sufficient gas permeability. When the nitrogen gas permeation rate through the porous substrate is set to be more than 7000 $m^3/m^2 \cdot hr \cdot atm$, it is necessitated to change parameters which determine the characteristics of the porous substrate, for instances, to increase the porosity of porous substrate, or to make the mean pore diameter larger.

Furthermore, the separation membrane of amended claim 1 provides unpredictable results over Lai, Verduijn and Goldsmith in terms of the permeation performance.

As shown in Fig. 6 of the specification, greater flux Q was observed for faster nitrogen gas permeation rate of the separation membrane. Namely, when the nitrogen gas permeation rate

was 200 $m^3/m^2 \cdot hr \cdot atm$, the flux Q was 5.0 $kg/m^2 \cdot hr$; when the nitrogen gas permeation rate was 250 $m^3/m^2 \cdot hr \cdot atm$, the flux Q was 5.5 $kg/m^2 \cdot hr$; and when the nitrogen gas permeation rate was 900 $m^3/m^2 \cdot hr \cdot atm$, the flux Q was 8.0 $kg/m^2 \cdot hr$. It was found that all of the samples show good values for the separation factor α, which are preferable. See, for example, page 5, paragraph [0056] of the specification. In comparision, Goldsmith, Lai and Moyer do not teach flux Q.

Verduijn teach flux Q. However, the teachings of Verduijn are not comparable with the presently claimed invention because the kind of membrane, the permeation material and the evaluation method are different between the present application and Verduijn.

Finally, the Examiner states that the references teach the mean pore diameter of the base layer, the mean pore diameter of the foundation layer and the thickness of the foundation layer and the base layer. The invention of the amended claim 1 is separation membrane with extremely excellent separation factor a because the invention pays attention to the nitrogen gas permeation rate and thickness of the foundation layer, and defines the gas permeation range to be 200 - 7000 $m^3/m^2 \cdot hr \cdot atm$ and the thickness of the foundation layer to be 10 - 200 μm. Therefore, the concept of the presently claimed invention of amended claim 1 is not found from the references.

Accordingly, the references were improperly combined based upon impermissible hindsight.

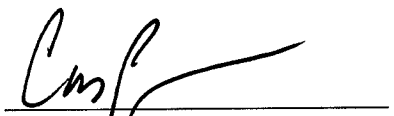
In view of the above, Applicants respectfully request reconsideration and withdrawal of the § 103 rejections of claims 1, 3-5 and 7-16

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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